

Development of the *SANUPS G53A* Emergency Diesel Generator

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1. Introduction

To date, SANYO DENKI has delivered many emergency diesel generators to telecommunications carriers and power companies, and the majority of these have been custom-made products tailored for each customer's requirements.

Meanwhile, in the emergency diesel generator market, there are generators standardized to meet Japan's Building Standard Law and Fire Service Law. In recent years, our customers have also demanded standardized emergency diesel generators to reduce installation and operating costs.

Against such a backdrop, we developed the *SANUPS G53A*, an outdoor emergency diesel generator that complies with Japan's Fire Service Law, as a solution for building disaster management that can also satisfy a wide-variety of customer requirements.

This article describes the details and features of the new product.

2. Product Overview

The *SANUPS G53A* is available in three different output capacities of 200/230 kVA, 250/290 kVA, and 290/320 kVA.

Figure 1 shows the appearance of the *SANUPS G53A*. It has a cubicle suitable for outdoor installation that contains a



Fig. 1 *SANUPS G53A*

diesel engine, AC generator, and control panel.

Figure 2 shows the control panel mounted inside the cubicle.

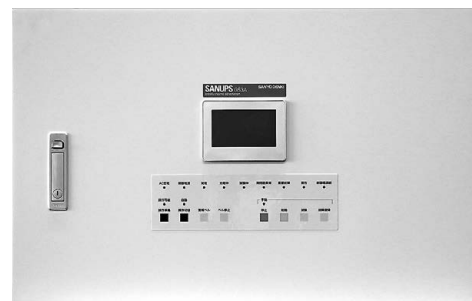


Fig. 2 Control panel front

3. Features

3.1 IoT-enabled

By using a general-purpose programmable logic controller (hereinafter "PLC"), we made the new product IoT-ready. It can connect to LAN and peripheral devices via general-purpose interfaces such as Ethernet and RS-485.

3.2 Broad customization options

This product has a broad range of made-to-order customization options including cold climate specifications, salt-resistant coating, 400 V voltage model, added measurement items, and a logging function.

3.3 Compliant with Japan's Fire Service Law

This product is safe for use as it satisfies the Nippon (Japan) Engine Generator Association requirements: Design Requirements for Emergency Use Engine-driven Power Generators (NEGA C 311).

3.4 Long-term backup

Combined with our uninterruptible power supplies (UPS), this product can supply power without interruptions.

Moreover, by connecting an optional large-capacity fuel tank, even longer extended backup is possible.

4. Product Functions

Figure 3 shows a function block diagram of the SANUPS G53A.

The SANUPS G53A consists of an output panel that has a generator output circuit (main circuit) and a control panel that has a generator control circuit containing a PLC, measurement circuit board, relay circuit board, and switch/LED circuit board.

4.1 Real-time monitoring of generator information

By combining a PLC that manages the generator information with a customer’s management system via network connection, the generator information (status, power generation status, various measurement values) can be remotely monitored in real time.

(1) Measurement circuit board

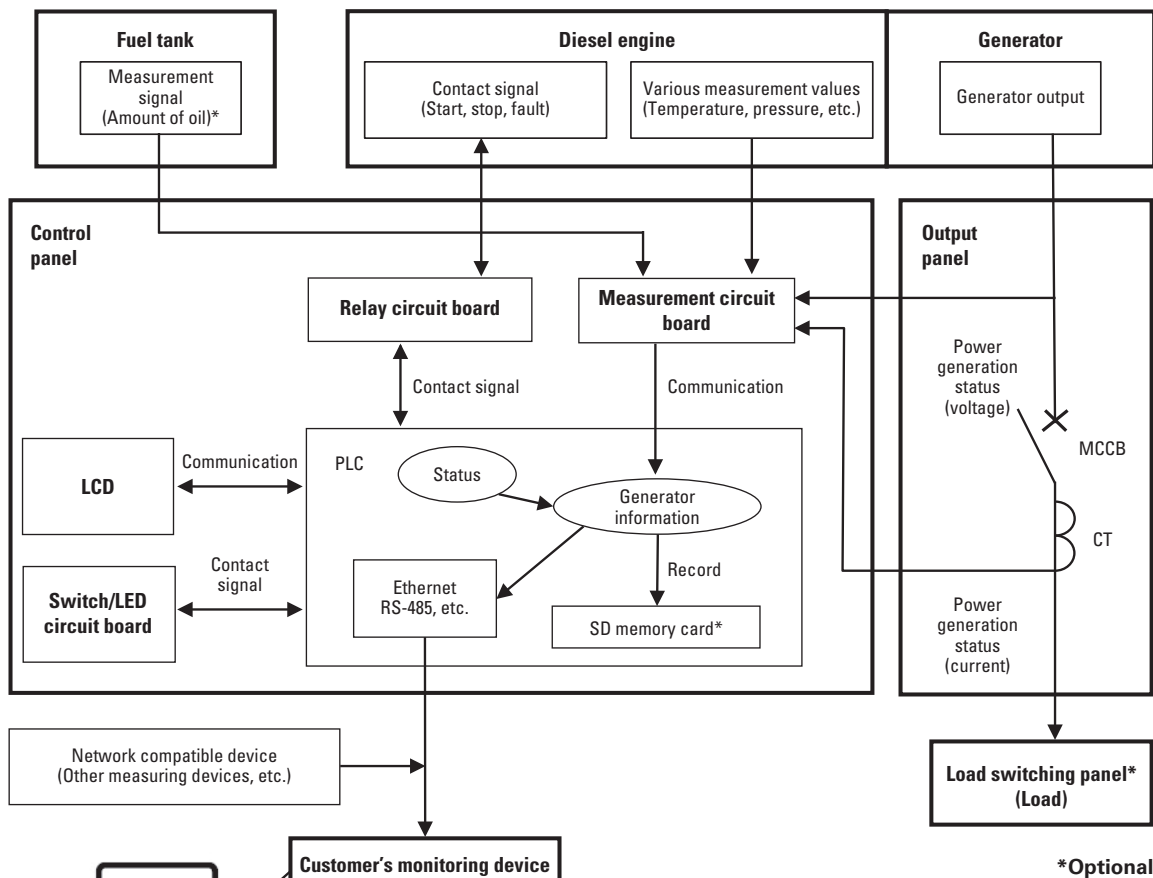
The measurement circuit board measures various measurement values such as output panel’s output power and current, as well as the diesel generator’s temperature and pressure. These measurement values are sent to the PLC and used for displaying generator measurements and controlling the generator.

(2) PLC

Manages and controls the generator status (standby, operation, failure) and measurement circuit board information. Can connect to a network via general-purpose interfaces such as Ethernet and RS-485.

(3) Logging function

An optional function for recording generator information when failures occur on an SD memory card.



Generator information	Item
Status	Standby, operation, failure
Power generation status	Voltage, current, power, frequency
Various measurement values	Cooling water temperature, lubricating oil pressure, battery voltage, etc.

Fig. 3 Function block diagram of the SANUPS G53A

5. Specifications

Table 1 shows the specifications of the *SANUPS G53A*.

Table 1 Specifications of the *SANUPS G53A*

Items		Unit	G53A204P	G53A254P	G53A294P		
Generator	Rated output capacity	Apparent power	kVA	200/230	250/290	290/320	
		Active power	kW	160/184	200/232	232/256	
	Protection rating / Cooling system			IP20/IC01			
	Rated voltage		V	200/220			
	Current		A	578/604	722/762	838/840	
	No. of phases/wires		—	3-phase 3-wire			
	Rated frequency		Hz	50/60			
	Speed		min ⁻¹	1500/1800			
	No. of poles		—	4			
	Power factor		—	0.8			
	Excitation type		—	Brushless			
	Thermal class		—	F			
Engine	Name		—	DP086LA	P126TI	P126TI-II	
	Type		—	Vertical water-cooled 4-stroke cycle diesel engine			
	Output power		kW	196/220	234/267	258/296	
	Turbo charger		—	Included			
	No. of cylinders		—	6			
	Bore × stroke		mm	111 × 139	123 × 155	123 × 155	
	Displacement		L	8.071	11.051	11.051	
	Cooling system		—	Radiator type			
	Radiator exhaust airflow		m ³ /min	190/224	370/433	450/530	
	Amount of cooling water		L	44	51	51	
	Fuel	Type		—	Diesel fuel (JIS No. 2)		
		Specific consumption		L/h	43.7/51.2	54.6/67.3	62.4/70.8
		Consumption rate		g/kWh	207/211	206/218	203/208
		Tank capacity		L	110	170	170
		Running time		h	2.5/2.1	3.1/2.5	2.7/2.4
	Lubricating oil capacity		L	15.5	23	23	
	Starting system		—	Electric starting motor			
Starting motor		V-kW	24-6.0	24-6.0	24-6.0		
Battery	Battery type		—	Valve-regulated lead-acid (VRLA) battery (MSE series)			
	Battery capacity		V-Ah	24-150	24-150	24-150	
Acoustic noise		dB(A)	85 max. ⁽¹⁾				
Operating environment		—	Ambient temperature: -10 to +40°C, Relative humidity: 85% max. (non-condensing), Altitude: 300 m or less ⁽²⁾				
Communication	Interface		—	Ethernet port: 100 BASE-TX / 10 BASE-T ⁽⁴⁾ Serial port ⁽³⁾ : RS-422/RS-485			
	Protocol		—	MODBUS TCP, MODBUS RTU ⁽⁴⁾			

(1) The average of the 4 points in each direction in each 1-meter interval.

(2) Output will have to be offset if the operating environment differs from this.

(3) Optional

(4) Ethernet is a trademark of Xerox Corporation, USA. MODBUS is a trademark of Schneider Electric SA.

6. Conclusion

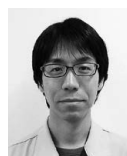
This article introduced the *SANUPS G53A*, which is equipped with IoT functions and can be customized with a wide variety of options to suit each customer's particular application.

With the IoT functions, the new product enables remote monitoring of generator information, reducing labor time of the management staff. Also, its wide customization options can meet the various needs of customers.

In recent years, Japan has faced numerous natural disasters, and securing emergency power supplies in the event of prolonged power outages has become a point of focus for customers in charge of disaster management for local governments or corporate crisis control.

In addition to generators capable of long-term backup such as the *SANUPS G53A*, we also manufacture and sell uninterruptible power supply (UPS) products that supply continuous power during power outages. SANYO DENKI is a one-stop provider of systems enabling long-term and high-quality power backup with our products, services, and technologies.

We will continue to contribute to the realization of a safe and secure society for customers through the supply of emergency power.



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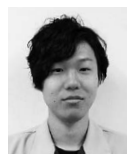
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